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| 10/035,444 | 01/04/2002 | Fumikazu Yamaki | 011796 | 3015 |

23850 7590 12/24/2003

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EXAMINER

TRAN, TAN N

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2826

DATE MAILED: 12/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,444

Applicant(s)

YAMAKI ET AL.

Examiner

TAN N TRAN

Art Unit

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AW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on amendment filed on 11/12/03.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. The indicated allowability of claim 10 is withdrawn in view of the newly discovered reference(s) to claim 10. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, as now amended, are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibasaki et al. (5,430,310) in view of Ishikawa (6,294,446).

With regard to claims 1,2, Shibasaki et al. discloses a high power semiconductor device for a radio communication system, comprising: a compound semiconductor substrate 1 having a resistivity of 10^7 ohm-cm at least at surface thereof or higher; a buffer layer 2 formed on the compound semiconductor substrate 1 wherein the buffer layer having lattice matching with InAs material; and an active layer 3 formed on the buffer layer 2 and having a high power active element for radio communication formed therein. (Note lines 52-54, and lines 55-59, column 2; lines 52-54, column 9, fig. 3 of Shibasaki et al.).

Shibasaki et al. does not disclose the buffer layer is a super lattice.

However, Ishikawa discloses a super lattice buffer layer 32 formed on the compound semiconductor substrate 31. (Note fig. 1 of Ishikawa).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Shibasaki et al.'s device having the buffer layer is a super lattice such as taught by Ishikawa in order to reduce threading dislocations.

With regard to claim 3, Shibasaki et al. and Ishikawa disclose all the claimed subject matter except for the active layer is formed at a position within 5.0 micrometer from a surface of the compound semiconductor substrate. However, it would have been obvious to one of ordinary skill in the art to form the active layer is formed at a position within 5.0 micrometer from the surface of the compound semiconductor substrate in order to maintain the lattice matching between the semiconductors and the sapphire substrate.

With regard to claims 4,5, Shibasaki et al. and Ishikawa disclose all the claimed subject matter except for an electrode formed on another surface of the compound semiconductor substrate and not electrically connected to the semiconductor device. However, it would have been obvious to one of ordinary skill in the art to form an electrode formed on another surface of the compound semiconductor substrate and not electrically connected to the semiconductor device in order to provide potential for semiconductor device.

With regard to claim 6, Shibasaki et al. and Ishikawa disclose all the claimed subject matter except for the electrode layer is connected to one power supply potential of the semiconductor device. However, it would have been obvious to one of ordinary skill in the art to connect the lower electrode layer to one power supply potential of the semiconductor device in order for the device to operate.

With regard to claim 7, Shibasaki et al. discloses a source electrode 5 and drain electrode 7 formed on the active layer 3, separated from each other so as to establish a channel region, and a gate electrode 6 formed above the channel region. (Note fig. 9 of Udagawa et al.)

With regard to claim 8, Shibasaki et al. discloses the active layer 3 has 2 dimensional electron gasses. (Note lines 17,18, and lines 55-59, column 1 of Shibasaki et al.).

With regard to claim 10, Shibasaki et al. and Ishikawa disclose all the claimed subject matter except for the compound semiconductor substrate has resistivity more than 1.0×10 Ohm-cm in total. However, it would have been obvious to one of ordinary skill in the art to form the compound semiconductor substrate has resistivity more than 1.0×10 Ohm-cm in total in order to reduce the resistance of semiconductor substrate. Note (lines 52-54, column 9, fig. 3 of Shibasaki et al.) is cited to support for the well-know position.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shibasaki et al. (5,430,310) in view of Ishikawa (6,294,446) and further in view of Usagawa et al. (5,373,191).

With regard to claim 9, Shibasaki et al. and Ishikawa do not disclose the active layer comprises: a collector layer of a first conducting type; a base layer of a second conducting type formed on the collector layer; an emitter layer of the first conducting type formed on the base layer.

However, Usagawa et al. (5,373,191) discloses the active layer comprises: an n-type collector layer 101, a p-type base layer 103, and an n-type emitter layer 105. (Note figs. 12a-12c and embodiment 6 in column 10 of Usagawa et al.).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Shibasaki et al. and Ishikawa's device having the active layer comprises: an n-type collector layer, a p-type base layer, and an n-type emitter layer such as taught by Usagawa et al. in order for forming the bipolar transistor.

Response to Amendment

3. Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tan Tran whose telephone number is (703) 305-3362. The examiner can normally be reached on M-F 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for after final communications.

Art Unit: 2826

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TT

Dec 2003


Minhloan Tran
Primary Examiner
Art Unit 2826